by IRVING ROTTENBERG and GEORGE M. COBREN

Automobile Output in the Postwar Period

AUTOMOBILE production has shown very substantial growth during the postwar period but also has been characterized by sharp cyclical and irregular movements. In 1955, for example, the output of passenger cars accounted for more than 5 percent of Gross National Product, a ratio which has not been surpassed since. In contrast, the ratio fell to 3 percent in the recession year of 1958, or no higher than it was in 1947, when industry was in the process of converting to peacetime production. In 1962 the ratio was almost 4 percent.

Because of its widespread effect on many industries and activities—such as suppliers of materials, distribution, transportation, and services allied to autos—and in view of the wide fluctuations in output and sales, auto output has clearly had an important influence on the course of GNP, particularly over the short run. This article presents for the first time an overall measure of the output of passenger cars—designated here as auto product—that can be directly compared with GNP. The auto product is shown on a quarterly basis with a breakdown given of the flows to consumers, business, Government, and the foreign market.[1] This statistical series will provide analysts with a new source of data for assistance in appraising current business conditions and business cycle movements.

Recent performance

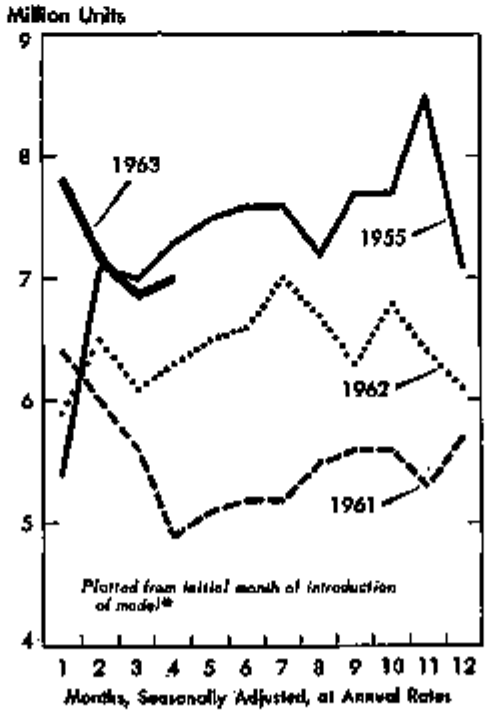
The 1963 model automobiles, which were placed on sale in dealer showrooms in late September and early October 1962, found immediate acceptance by consumers and business. Although deliveries of domestically-produced autos earlier in the year had been high—ranging from 6 million to 7 million units at seasonally adjusted annual rates—fourth quarter deliveries of over 7 million cars at annual rates broke all previous records for the period.

January 1963 sales were also at an annual rate of about 7 million units. Not only has automobile output been an important stimulating factor in recent months but its contribution to the rise in total output since the current upturn started has been considerable. Since the first quarter of 1961 increased auto production has accounted for about 15 percent of the rise in real GNP.

The use of automobiles has now spread to virtually all segments of the population as a result of rising incomes, the large volume of accumulated assets, and the availability on a mass scale of installment credit with long maturities. Automobile registrations more than doubled in the postwar period, rising from 28 million in 1946 to an estimated 65 million at the end of 1962. The latter figure becomes more impressive when put into the perspective of a population of close to 190 million and 56 million households in the United States. About 80 percent of passenger car purchases is for personal use, less than 1 percent for Government, with the remainder for business purposes such as taxicabs, business fleets, car rental agencies and unincorporated businesses.

DEALER SALES OF NEW AUTOS (Excluding Imports) IN SELECTED MODEL YEARS

Sales of 1963 Models Strong, Compare Favorably With 1955 Sales



* Initial Month of Model Year: Nov. 1954, Oct. 1960, Oct. 1961 and Oct. 1962

U.S. Department of Commerce, Office of Business Economics 63-2-6

Comparisons of the growth in U.S. population and in increased auto registrations are revealing. Over the entire postwar period the population has increased about 1.8 percent annually. Auto registrations, on the other hand, though erratic in the early postwar years, had an average growth per annum of about 6 percent through 1957. Since that year the annual growth rate in auto registrations was a little more than 3 percent and has shown minor annual variation, except in the recession year of 1958.

The increased use of the automobile in the U.S. economy has both long-run and short-run importance. From the long-run viewpoint it has been a factor of great significance in the growth of the economy—particularly when all the related aspects of an automobile-oriented economy, such as road building and suburban growth—are taken into account. In the short run, which is the focus of this article, it appears as a fluctuating element in the economy, contrasting with the steady rise in expenditures made for the operation and maintenance of the growing stock of motor vehicles.

1. See also Lawrence Grose and Edward O. Bassett, Automobile Purchases by Business and Consumers, *Survey* March 1962.

Auto Product By Major Components, Seasonally

[Billions of dollars]

	1947					1948					1949					1950				
	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year
Auto product [1]	6.6	7.3	6.9	8.1	7.2	8.5	7.7	8.9	9.9	8.7	10.0	12.5	13.0	11.3	11.9	13.3	15.1	17.2	16.1	15.4
Personal consumption expenditures	4.7	4.5	4.2	5.7	4.8	5.8	5.2	6.2	6.3	5.9	7.1	9.1	8.9	8.4	8.9	10.0	10.7	12.1	11.2	11.3
Producer's durable equipment	2.0	1.9	1.8	2.4	2.1	2.4	2.9	2.4	2.3	2.3	2.6	3.2	3.1	3.2	3.0	3.2	3.4	4.1	3.4	3.6
Change in dealers' auto inventories	−.5	.4	.3	−.5	−.1	−.1	.1	−.1	.2	.2	(*)	−.3	1.2	−1.6	−.1	.2	−.2	−.5	1.0	.3
Net exports	.4	.5	.4	.4	.4	.4	.3	.3	.4	.4	.3	.3	.3	.3	.3	.2	.2	.3	.4	.3
Exports	.4	.5	.4	.4	.4	.4	.4	.4	.4	.4	.4	.3	.3	.3	.3	.2	.3	.3	.4	.3
Imports	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Addendum:																				
New cars, domestic [2]	6.0	6.5	6.1	7.3	6.5	7.6	6.8	7.9	8.9	7.8	9.2	11.5	12.0	10.5	11.1	12.7	14.8	16.2	15.1	14.6
New cars, foreign	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)

	1955					1956					1957					1958				
	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year
Auto product [1]	22.0	21.6	21.9	21.3	21.7	17.4	16.9	15.6	16.4	16.3	20.0	18.6	20.3	17.0	19.1	13.6	13.0	12.6	16.5	13.9
Personal consumption expenditures	10.5	10.7	11.5	10.9	10.7	11.4	12.1	13.3	14.1	12.5	15.4	14.8	15.2	14.4	14.9	12.0	11.4	11.4	12.0	11.9
Producer's durable equipment	3.0	3.7	3.3	3.6	3.7	3.2	2.9	2.9	3.1	3.0	3.3	3.2	3.3	3.1	3.3	2.6	2.4	2.3	2.6	2.5
Change in dealers' auto inventories	1.4	.8	−.2	1.2	.7	−.9	−.6	−1.1	.7	−.4	.8	.2	2.1	−.7	.0	−1.1	−.9	−1.1	1.8	−.4
Net exports	.5	.5	.6	.5	.5	.6	.5	.3	.4	.4	.5	.3	.2	.1	.2	.1	(*)	−.1	−.1	(*)
Exports	.6	.8	.7	.6	.6	.7	.6	.5	.6	.6	.6	.5	.5	.5	.5	.5	.4	.5	.6	.5
Imports	.2	.1	.1	.1	.1	.1	.1	.1	.2	.1	.2	.3	.3	.4	.3	.4	.4	.5	.6	.5
Addendum:																				
New cars, domestic [2]	21.0	20.5	20.7	20.2	20.6	16.3	16.0	14.6	17.2	15.7	18.8	17.4	19.5	16.7	17.8	12.4	11.7	11.4	15.1	12.6
New cars, foreign	.1	.1	.1	.2	.1	.2	.2	.2	.3	.2	.3	.4	.5	.5	.4	.8	.7	.8	1.0	.8

[Billions of 1954 dollars]

	1947					1948					1949					1950				
	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year
Auto product [1]	8.3	9.1	8.2	9.5	8.8	10.0	8.9	9.7	10.5	9.8	10.7	13.1	14.0	12.2	12.6	14.3	15.1	18.1	16.9	16.4
Personal consumption expenditures	5.9	6.0	5.9	6.7	6.2	6.8	6.9	6.7	6.9	6.8	7.8	8.9	9.5	10.2	9.2	10.8	11.4	13.3	12.8	11.9
Producers' durable equipment	2.5	2.4	2.2	2.9	2.5	2.8	2.3	2.6	2.6	2.6	2.8	3.4	3.3	3.5	3.2	3.0	3.7	4.3	3.6	3.8
Change in dealer's auto inventories	−.6	.5	.5	−.7	−.1	−.2	.2	−.2	1.0	.2	(*)	−.2	1.4	−1.8	−.2	−.3	.7	−.3	1.1	.3
Net exports	.5	.6	.6	.6	.6	.5	.4	.4	.4	.4	.4	.3	.3	.3	.3	.3	.3	.3	.4	.3
Exports	.6	.6	.6	.6	.6	.5	.4	.4	.4	.4	.4	.3	.3	.3	.3	.3	.3	.4	.5	.3
Imports	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Addendum																				
New cars, domestic [2]	7.9	8.6	7.8	9.1	8.4	9.5	8.4	9.1	9.9	9.2	10.0	12.5	13.9	11.5	12.0	13.9	15.4	17.4	16.2	15.5
New cars, foreign	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)

	1955					1956					1957					1958				
	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year
Auto product [1]	20.7	20.5	20.7	20.1	20.5	16.5	14.9	14.3	16.1	15.4	17.5	16.1	18.0	14.3	16.6	11.7	11.2	10.7	13.7	11.9
Personal consumption expenditures	15.4	15.9	16.9	15.1	15.7	13.7	12.2	12.2	12.2	12.5	13.5	12.8	13.1	12.6	13.0	10.4	9.9	9.7	10.0	10.2
Producer's durable equipment	3.4	3.5	3.6	3.3	3.5	3.0	2.7	2.7	2.7	2.7	2.9	2.8	2.8	2.7	2.8	2.2	2.0	2.0	2.1	2.1
Change in dealers' auto inventories	1.3	.5	−.2	1.1	.7	−.8	−.5	−1.0	.7	−.4	.7	.2	1.9	−.0	.5	−.0	−.8	−.9	1.1	−.4
Net exports	.5	.6	.6	.5	.5	.5	.4	.3	.4	.4	.3	.2	.1	.1	.2	(*)	(*)	−.1	−.1	−.1
Exports	.6	.6	.6	.6	.6	.6	.5	.4	.5	.5	.6	.5	.5	.5	.5	.4	.4	.4	.4	.4
Imports	.1	.1	.2	.1	.1	.1	.1	.1	.2	.1	.2	.3	.3	.4	.3	.4	.4	.5	.6	.5
Addendum:																				
New cars, domestic [2]	20.6	20.5	20.7	20.1	20.5	16.6	14.9	13.4	15.2	14.5	16.5	15.2	17.0	13.3	15.8	10.7	10.1	9.6	12.5	10.7
New cars, foreign	.1	.1	.1	.2	.1	.2	.2	.2	.3	.2	.3	.4	.5	.5	.4	.5	.7	.8	1.0	.8

*Less than $50 million.

1. The Auto product total includes government purchases. 2. These purchases were less than $50 million from 1947 through 1951 and between $50 million and $100 million in subsequent years.

The concept of auto product

Expenditures for passenger cars enter the GNP via many different channels: Personal consumption spending, Government purchasing, business investment (including dealers' investment in passenger car inventories), exports and imports. The auto product series introduced here represents a convenient grouping of these separate automotive expenditure flows which facilitate study of the relationships of this important area to the GNP and its major components.

In the present estimates, passenger car purchases for use by consumers and business—the two principal purchaser groups—are measured on a *net* basis. This is equivalent to the gross value of new and used car purchases less amounts received from trade-ins

Adjusted Quarterly Totals At Annual Rates, 1947–1962

(Billions of dollars)

1961					1962					1963					1964				
I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year
35.5	35.5	32.1	31.8	33.3	31.2	32.0	8.6	35.9	32.1	36.2	36.7	37.7	33.3	36.1	34.3	35.4	34.3	35.2	34.8
31.3	30.1	2.1	2.9	2.9	2.7	0.9	7.8	31.0	8.3	32.6	32.7	32.9	31.7	32.5	31.7	32.2	31.5	32.8	32.1
3.3	2.9	2.0	2.4	2.8	2.5	2.0	1.9	2.0	2.9	2.7	2.8	2.8	2.6	2.7	2.0	2.7	2.4	2.8	2.7
.4	.3	−.1	(*)	.1	−.4	−.3	−.1	1.0	.1	.6	.6	1.4	−1.0	.4	−.4	(*)	−.3	−.9	−.4
.5	.6	.5	.4	.5	.4	.4	.3	.4	.4	.4	.4	.5	.4	.4	.4	.4	.4	.4	.4
.6	.6	.5	.4	.5	.4	.4	.3	.4	.4	.5	.5	.6	.5	.5	.4	.5	.4	.5	.5
(*)	(*)	(*)	(*)	(*)	(*)	(*)	.1	.1	.1	.1	.1	(*)	(*)	(*)	(*)	(*)	.1	.1	.1
34.8	32.0	31.8	31.0	32.5	30.5	32.0	0.0	34.8	31.5	35.8	36.4	37.0	34.5	36.1	34.3	35.8	34.9	35.2	35.2
(*)	(*)	.1	.1	.1	.2	.1	.1	.1	.1	.1	.1	.1	.1	.1	.3	.1	.1	.1	.3

1959					1960					1961					1962				
35.8	36.2	34.5	35.6	35.5	22.2	20.8	21.5	19.2	20.5	14.4	17.5	17.6	20.3	17.5	20.1	21.1	21.6	22.4	21.5
16.0	16.2	16.3	14.3	15.5	16.7	16.9	16.3	16.9	16.4	13.7	14.1	14.5	15.8	14.5	16.8	17.2	16.9	16.8	17.4
3.1	3.2	3.3	2.9	3.2	3.4	3.5	3.4	3.3	3.4	2.0	3.0	3.1	3.3	3.1	3.5	3.7	3.8	4.0	3.7
.8	.8	−.2	−1.3	(*)	2.1	.4	1.2	−.2	.9	−2.6	.1	−.3	1.1	−.4	−.5	−.2	.6	.2	(*)
−.2	−.3	−.3	−.4	−.3	−.3	−.1	(*)	.3	−.1	.2	.2	.2	.1	.2	.1	.3	.3	.2	.2
.4	.5	.5	.4	.5	.5	.5	.4	.5	.5	.4	.4	.5	.5	.5	.5	.6	.7	.7	.5
.7	.8	.8	.9	.8	.9	.6	.4	.4	.5	.3	.3	.3	.4	.3	.4	.4	.4	.6	.4
17.1	18.5	17.7	14.0	16.8	20.6	19.2	19.3	17.7	19.2	12.0	16.0	16.2	19.2	16.1	18.8	19.0	20.2	21.9	20.1
1.2	1.2	1.2	1.3	1.2	1.2	1.1	1.0	.9	1.1	.8	.7	.7	.7	.7	.7	.7	.7	.7	.7

[Billions of 1954 dollars]

1961					1962					1963					1964				
I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year	I	II	III	IV	Year
36.0	34.3	33.3	31.8	33.5	30.8	32.2	9.2	34.3	31.6	35.6	36.1	37.2	33.4	35.8	34.0	35.4	34.4	35.2	34.8
31.7	30.4	3.3	2.7	30.0	8.4	0.0	7.3	30.5	8.0	32.0	32.5	32.6	32.2	32.3	31.5	32.2	31.3	32.8	32.1
3.4	3.0	2.0	2.4	2.9	2.2	2.5	1.8	2.4	2.2	2.0	2.7	2.7	2.7	2.7	2.0	2.7	2.4	2.8	2.7
.4	.3	−.1	(*)	.3	−.4	−.3	−.1	1.0	.1	.6	.6	1.4	−1.0	.4	−.4	(*)	−.3	−.9	−.4
.5	.6	.5	.4	.5	.4	.4	.3	.4	.4	.4	.4	.5	.4	.4	.4	.4	.4	.4	.4
.6	.6	.5	.4	.5	.4	.4	.3	.4	.4	.5	.5	.6	.5	.5	.4	.5	.4	.5	.5
(*)	(*)	(*)	(*)	(*)	(*)	(*)	.1	.1	.1	.1	.1	(*)	(*)	(*)	(*)	(*)	(*)	.1	(*)
35.4	32.5	31.5	30.3	32.8	30.0	31.3	8.8	33.0	30.8	34.8	35.4	36.5	32.6	35.1	33.2	34.0	33.7	34.3	34.0
(*)	(*)	.1	.1	(*)	.3	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1

1959					1960					1961					1962				
35.4	36.5	35.6	34.7	35.5	35.3	37.1	37.4	36.3	37.3	32.0	34.5	34.4	37.3	34.5	36.8	37.4	37.7	38.4	37.8
32.4	33.2	33.3	33.4	33.1	33.8	33.9	33.5	33.3	33.7	31.5	31.9	31.9	33.3	32.1	34.1	34.2	33.9	33.7	34.5
2.5	2.7	2.7	2.7	2.6	2.6	2.9	2.8	2.8	2.8	2.4	2.4	2.5	2.8	2.5	2.0	3.0	2.9	3.3	3.0
.7	.7	−.2	−1.1	(*)	1.8	.4	1.0	−.2	.8	−2.1	.1	−.2	.6	−.3	−.4	−.2	.5	.2	(*)
−.2	−.3	−.3	−.4	−.3	−.2	−.1	(*)	.1	−.1	.1	.1	.1	.1	.1	.3	.2	.2	.1	.2
.4	.4	.4	.3	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.4	.5	.6	.6	.5
.6	.7	.7	.7	.7	.7	.6	.4	.3	.5	.3	.2	.3	.3	.3	.4	.3	.4	.4	.4
14.0	15.0	14.3	13.4	14.2	17.0	15.7	15.0	14.8	15.9	10.7	13.2	13.2	16.1	13.3	15.0	15.5	15.6	18.2	16.5
1.1	1.2	1.1	1.2	1.1	1.1	1.0	.9	.8	.9	.7	.7	.6	.6	.6	.6	.6	.6	.6	.6

2. Differs from the total auto product by the markup on both used cars and imported cars.

and other disposals. When combined with net exports, Government purchases, and the change in auto inventories, such net outlay measures yield the desired total auto output for GNP purposes. This method also gives the correct figures for expenditures, saving, and investment for the separate purchaser groups.

Several important features of the auto product concept should be noted. The value of auto output reflects the contribution of many industries to the finished new car—glass, rubber, steel, plastic components, etc. In addition to the value of automobile production these estimates include all costs and profits in the distribution of new, used, and imported automobiles. It includes the value of parts and accessories (radio, heater, etc.) sold as

original equipment, but excludes the value of parts and accessories sold in the "aftermarket" for replacement or as additional accessories. Trucks and buses are not included in auto product nor are expenditures for such items as gasoline, oil, maintenance, repairs, and insurance.

A technical appendix below gives the sources of basic data and the methodology used in estimation of the auto product, by major component, in both current and constant dollars. The constant dollar estimates take account of the changing product mix. In the case of the new car component the physical volume measure makes allowances for shifts between higher and lower priced cars and for changes in accessories included as standard equipment or purchased as extras with new cars. Of particular importance in recent years was the shift from larger, high horsepower units to compacts. Although the constant dollar estimates attempt to measure, insofar as possible, the real volume of auto output on a basis that is more comprehensive than a count of units produced, it should be noted that some elements of quality change are not susceptible to statistical measurement.

The postwar trend

In the early postwar years auto product averaged about $9 billion in constant 1954 prices. The demand for new cars in that period far exceeded supply—the upward trend persisting throughout the 1948–49 recession. With rapidly rising output, the value of auto product reached an annual rate of $18 billion in the third quarter of 1950 following the outbreak of the Korean conflict.

Scarce materials were under allocation during the Korean period and auto output fell about 50 percent, turning up again with the end of active combat. The renewed rise was temporarily interrupted by the 1953–54 recession. Calendar year 1955 was the banner year and has since been the standard of peak output, with auto product amounting to $20½ billion in 1954 prices. In the late 1950's and early 1960's auto production continued to fluctuate widely, ranging on an annual basis from $12 billion in 1958 to $18 billion in 1962.

While the level of auto output is not large when gaged against total GNP, it has had a disproportionately large effect on the short-run changes in the national output. During the postwar period the average quarterly change in Gross National Product at annual rates has been $5.0 billion in 1954 prices. Over the same period the auto product series showed an average quarter-to-quarter change of $1.5 billion, equivalent to about 30 percent of the corresponding GNP change.

Cyclical comparisons

Auto output has shown a varied picture in the four postwar recessions as may be seen below:

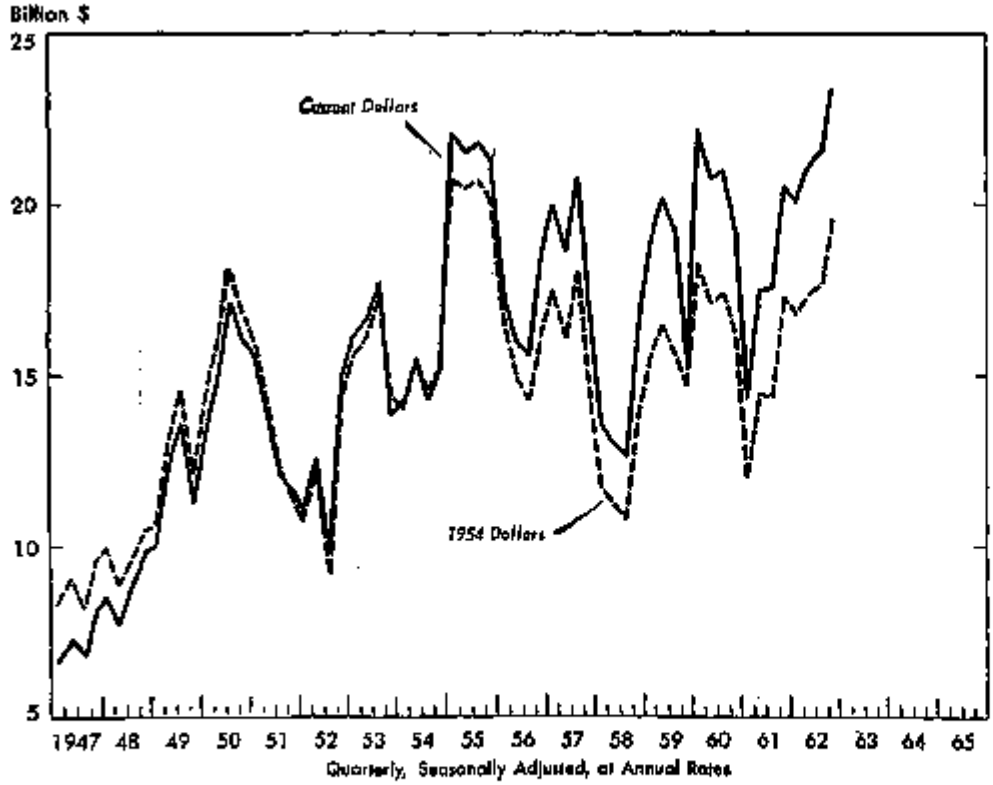
GNP peak	GNP trough	Change in GNP (seasonally adjusted annual rates, billions of dollars)	Change in auto product (seasonally adjusted rates in billions of 1954 dollars)
4th quarter 1948	to 2d quarter 1949	−7.0	+2.6
2d quarter 1953	to 3d quarter 1954	−13.7	−.7
3d quarter 1957	to 1st quarter 1958	−10.0	−6.3
2d quarter 1960	to 1st quarter 1961	−8.4	−5.1

In appraising the above data the existence of backlogs in the early period should be kept in mind. Thus, because of the continued strong demand even during the 1948–49 recession auto output advanced. By way of contrast, auto output accounted for about one-third of the decline in total GNP in constant dollars in the fairly sharp setback late in 1957, and was more than half of the drop in total GNP in the 1960–61 period.

In the first postwar recession, the strong deferred demand for autos provided a partial offset to the overall decline in the GNP. In each succeeding recession, however, the decline in auto product has constituted an increasingly larger share of the total drop in the GNP. In the 1960–61 period,

AUTO PRODUCT, BY QUARTERS, 1947-62

- Auto Output Has Fluctuated Widely in Postwar Period
- In Current Dollars, Production Is at a Peak, but in Physical Terms 1962 Fourth Quarter Not Up to the 1955 High



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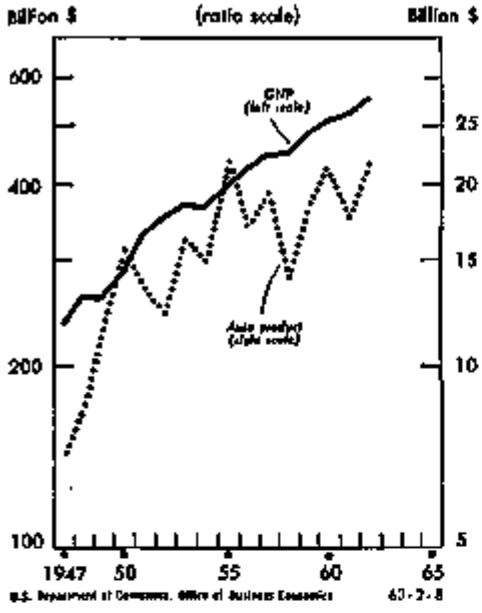
AUTO PRODUCT AND GNP

In Recent Years Auto Production Has Not Matched the Rise in Total Output



the contraction in auto output was equivalent to more than half of the total GNP change.

In expansionary periods also, auto production has had a significant effect on overall activity—for example, during the late 1954 and early 1955 upturn. However, since the former has rarely exhibited sustained advances of more than a year's duration since 1950, while overall expansionary periods for the GNP have been of about 3 or 4 years' duration, the importance of increased auto output in the entire GNP advance appears diminished.

Marked swings in auto inventory investment

Auto inventory investment has shown marked fluctuations as compared with total auto production and with changes in nonfarm business investment in inventories. We are concerned here with the second differences in inventories held by retail dealers, seasonally *adjusted* quarterly data in current dollars at annual rates. For the postwar years the average quarterly change in nonfarm business inventory investment has been $2.9 billion (ignoring the direction of the change) whereas the comparable change applicable to dealer inventories of new and used cars has averaged $1 billion.

Review of the quarterly data shows that the figures for total inventory change have occasionally been a reflection primarily of changes in auto inventory investment. As the trough of the recession was reached in the fourth quarter of 1949, for example, nonfarm business inventory investment dropped by about $4 billion while auto inventory investment was off almost $3 billion.

At times the direction of change in auto inventory investment has differed from that of total inventory investment. From the fourth quarter 1961 to the first quarter 1962 for example, there was an upward change in the total of less than $1 billion while the auto change was down $1.5 billion. In each of the next two quarters, the overall rate of inventory accumulation was reduced by over $2½ billion. Auto inventory investment, however, moved upward in these two periods by $.3 billion and then by $.8 billion.

Exports high in 1962—favorable trade balance in autos restored

Exports of automobiles have generally ranged between $300 million and about $600 million throughout the postwar years; however, exports in both 1955 and 1962 exceeded $600 million. Imports of foreign autos were negligible in the 1940's and the early part of the 1950's. With the spreading popularity of small cars the value of imported new cars rose from less than $100 million in 1955 to almost $800 million in 1959. From 1958 to 1960 the value of imports (at port of entry) exceeded the value of exports with the deficit amounting to $300 million in 1959.

The major domestic producers brought out their compact cars in late 1959 with the introduction of the 1960 models. Domestically produced compacts were well received by consumers not only gaining a substantial share of the market but also having a major impact on the imported car market. By 1961 the foreign trade balance in automobiles was again favorable.

Imports of most foreign automobiles declined after the introduction of domestic compacts with the exception of imports from West Germany. From 1959 to 1962 all imports dropped from 668,000 units to an estimated 350,000 autos but West Germany provided a little over 200,000 units in both years.

Technical Note

IN the course of putting together the auto product estimates some of the component series were revised using the latest available source data. The adjustment for seasonal variation was also reworked, reflecting the overall postwar experience. Although these modifications have not yet been incorporated in the GNP total, it is believed that their inclusion would not significantly change the presently published GNP estimates, nor materially alter the general relationships reviewed in this article.

As noted earlier, auto product is equivalent to the gross value of new and used car purchases less amounts received from trade-ins and other disposals. In the absence of comprehensive data on net outlays for passenger cars, the estimates have been derived by an indirect procedure. For the two major categories involved—personal consumption expenditures and producers' durable equipment—net outlays have been approximated by summing the gross value of new cars purchased, the gross margins on used cars purchased, and subtracting the change in dealers' used car inventories. An example will illustrate the transactions involved as reflected in the present estimates.

Suppose that there are only two new cars produced in the economy during a given period, each valued at $2,000; that the cars are purchased by two consumers each of whom trades in a used car valued at $400; that one of the used cars is sold to a third consumer for $500 during the current period, and that the other used car goes into dealers' inventory (i.e., used car inventory change is +400). The entries in this case would appear as follows:

1. Personal consumption expenditures			$3,700
2. New cars	$4,000		
3. Margin on used cars	100		
4. Less: Change in used car inventories	400		
5. Change in dealers' inventories			400
6. Auto gross product (1)+(5)			4,100

It will be noted that the net outlay recorded in personal consumption expenditures, $3,700, is equivalent to the net outlay of the two new car purchasers $3,200 ($2,000−$400)×2, plus the net outlay of the used car purchaser, which was $500.

It may be further observed that although the change in used car inventories enters into the calculation of both personal consumption and change in business inventories, the net effect of the used car inventory change on the total auto product is zero—as it should be since it represents production of a prior period.

The estimating procedures followed for the components of the auto product are outlined below.

New cars, domestic

The total current value of domestic passenger car expenditures was estimated as a product of the number of domestically produced new cars sold in the U.S. and the average retail price per car. Since January 1951, the number of cars sold is based on franchised dealers' sales as regularly reported in trade journals. Prior to 1951 the number series used was new passenger car registrations compiled by the R. L. Polk Co., with a small upward adjustment for the estimated difference between registrations and dealers' sales as suggested by earlier data for both series.

The average retail price of new cars was derived by a series of steps. First, an average was computed for the largest-selling cars priced by the Bureau of Labor Statistics. Second, this average was adjusted to cover other makes of cars by applying the ratio of average list prices for all cars from *Automotive News*, weighted by registrations, to the weighted composite list price of the cars priced by BLS. Third, an adjustment was made for extra equipment purchased with the new cars. This was estimated from data on the proportion of each make of car incorporating specific types of extra equipment as reported periodically by *Wards' Automotive Reports*, and retail prices for each type of equipment published in *Automotive News*.

Prior to 1955, the BLS retail price series for new cars was essentially based on list prices, but subsequently prices have been collected net of cash discounts or overallowance on trade-ins. It is assumed here that the full list price was realized through 1951, but from 1952 through 1954 a procedure was adopted for incorporating excessive trade-in allowances, when necessary, with used car margins.

Used cars margins

In national income accounting only outlays associated with the selling of used cars—as measured in the gross margins of dealers selling used cars—is counted as part of the production of the current period. The portion of the sales value other than the gross margin is omitted as it has already been included in the output totals for prior periods (when the used cars were produced).

Data for estimating gross margins on used car sales have been, for the most part inadequate. In general, the estimates were derived by applying gross margin ratios to total used car sales. The sales estimates were based on the 1948 and 1954 retail censuses, used car purchases of the Federal Reserve Board's *Survey of Consumer Finances*, and the monthly retail trade report of the Bureau of the Census. Gross margin ratios were developed from corporate tax returns of automobile dealers, partnership returns of automotive dealers, the special Census Bureau-Internal Revenue Service sample of tax return data of used car dealers for 1948 and 1954, and National Automobile Dealers Association data for the period beginning with 1950.

New cars, foreign

This series, like the domestic car expenditures, was estimated as a product of the number of units sold and an average price per car. The number of imported cars sold in the U.S. was based on R. L. Polk Co. registrations as reported in *Automotive News*. The average price of imported cars sold was based on estimates made for the years 1958 and 1959 using port-of-entry price information for 55 different makes of imported cars also obtained from *Automotive News*. The weighted average port-of-entry price for all foreign cars was then adjusted to include allowances for freight within the United States, sales taxes, and extra equipment to arrive at the estimated average delivered prices for 1958 and 1959. These prices were extrapolated forward and back by the average value implicit in the Bureau of the Census data on imports of new cars.

Allocation by type of purchaser

Since passenger car sales are not reported separately by type of purchaser this breakdown is approximated by indirect procedures which involve many difficult definitional problems. After deduction of Government purchases—which represent only a fraction of 1 percent of the total—expenditures for domestic new cars, and for used car margins have been allocated between personal consumption expenditures and producers' durable equipment, largely on the basis of road-use surveys made by the Bureau of Public Roads. These results have been tested to the extent feasible by other procedures which are described—along with the basic road-use surveys—in the March 1962, *Survey of Current Business*, page 17. The same allocation pattern was used for domestic new cars, used car margins, and the change in dealers' used car inventories. All imported car purchases have been assigned to personal consumption expenditures. It should be noted that while this allocation pattern is at best rough, inaccuracies do not affect the magnitude of the total auto product.

Change in retail dealers' auto inventories

The inventory change component of auto product has been restricted to the change in retail dealers' stocks of domestically produced new and used cars (and to a limited extent foreign used cars). Due to data limitations the procedure, in effect, assumes that imported new cars are sold in the same period that they are received in the United States. The change in auto manufacturers' inventories is excluded because completed passenger cars, which represent the principal focus of the auto product, are believed to represent only a small fraction of the total inventory change in this industry—and this portion is not separately available. Manufacturers' auto shipments are characteristically made almost immediately upon completion of the assembly process.

New Cars: The value of the net change in new car inventories was obtained by multiplying the change in the number of cars in dealers' inventories by the average cost value per car. The number of cars held in franchised dealers' inventories for the period back to 1951 was obtained from trade journals. Estimates for the preceding periods were based on the implicit inventory changes derived by subtracting dealers' domestic sales and exports from factory sales. The average cost value per car in dealers' inventories was estimated by dividing the wholesale value of new cars sold by U.S. assembly plants, by the number of cars sold as indicated in the factory sales series; both of these time series are published in *Automobile Facts and Figures, 1962.* The computed average cost value was adjusted to include the estimated freight costs to the dealer.

Used Cars: The number of used cars held in inventories by franchised new car dealers is available back to 1951 in trade journals. This series was increased to include the inventories of used car dealers on the basis of Census Bureau information which showed for 12 quarters between 1954 and 1957, the number of used cars held by used car dealers. The average ratio of used cars held by both new car and used car dealers, to the used car inventories of new car dealers only in this 1954–57 period provided the adjustment factor for estimating the inventories of nonfranchised dealers used for other periods.

The average cost per used car in franchised new car dealers' inventories for the period back to 1951 was obtained from the National Automobile Dealers Association report, "Operating Averages for the Automobile Retailing Industry". There is no comparable information for used car dealers but informed sources at NADA were of the opinion that the average cost of used car inventories would be about the same for both types of dealers.

Multiplying the total number of used cars held by all dealers, by the average cost per unit yielded a value series for the period 1951 to date. The total value of both new and used car stocks for yearend 1951 was extrapolated back on the basis of wholesale automotive paper held by finance companies. The new car inventory estimates, described above, were then subtracted from this extrapolated new and used car inventory total yielding the used car inventory estimate as a residual for the pre-1951 period.

Exports and imports

Data were obtained from the Bureau of the Census publications, *Quarterly Summary of Foreign Commerce of the United States*, table 3 (for exports), and table 5 (for imports); *United States Exports of Domestic and Foreign Merchandise—Commodity by Country, FT 410;* and *United States Imports of Merchandise for Consumption—Commodity by Country of Origin, FT 110.* Exports include the categories, new automobiles, used automobiles, and engine bodies and parts ready for assembly (knocked-down autos). Imports include new automobiles and used automobiles.

Seasonal adjustment

The derivation of seasonal factors for the various series comprising the auto product was done by the Census Method II Program. A description of the methodology is available from the Bureau of the Census on request. The seasonal factors were reviewed and modifications made in a few instances where necessary. In the case of the principal component series—domestically produced new cars—the number of units and the average price per unit were separately adjusted for seasonal variation. A trading-day adjustment was made in the number series prior to seasonal adjustment. The unadjusted quarterly data are available on request.

Deflation

New cars, domestic: This current dollar series was deflated by an unpublished seasonally adjusted consumer price index for new cars compiled by the Bureau of Labor Statistics.

New cars, foreign, and imports: In the absence of a suitable composite price index for imported cars, it was assumed that such an index could be approximated for recent years (when imports rose significantly) by the movement of the port-of-entry prices of Volkswagens. This is a fairly standardized car and constitutes the largest selling imported car. This series was available from *Automotive News* for the period 1957–1962. For the years prior to 1957, when the volume of imported cars was very small, the wholesale price index for U.S. motor vehicles was used.

Used car margins: The deflated series was derived as a product of the 1954 average margin per used car—adjusted to exclude excessive trade-in allowance—and the number of used cars sold.

Change in business inventories and Exports: Both of these series were deflated by the BLS wholesale price index for motor vehicles.

Government Programs

(*Continued from page 12*)

pected to continue to advance, reflecting both steady addition to State and local employment and higher wage rates.

It is difficult to project State and local government receipts over the next year and a half. Sales and income taxes would generally rise about in line with the expected expansion in economic activity. However, passage of the Administration's tax program may automatically yield additional revenues to State and local governments. Where Federal taxes are deductible under State income tax laws, a reduction in Federal tax payments will automatically increase taxable incomes for State and local tax purposes. In addition, many States follow the Federal format in allowing deductions. Structural reforms tightening deductions allowable under the Federal tax laws, also would give increased revenues to these States. Since State and local governments have actually more projects on hand than they are able to finance readily, a large proportion of any increase in revenues may go for higher expenditures. Thus it would be reasonable to expect the continuation of a small short-fall in aggregate receipts over expeditures of State and local government units.